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Session X. Airborne Doppler Radar / Industry

N 9 1 - 2 4 1 5 0

Status of Bendix Research
Daryal Kuntman, Bendix

**DOPPLER WEATHER RADAR
WITH
PREDICTIVE WINDSHEAR DETECTION CAPABILITY**

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WE ARE...

**A DIVISION OF ALLIED-SIGNAL AEROSPACE COMPANY WHICH IS
A PART OF ALLIED-SIGNAL CORPORATION.**

**HAVE BEEN MANUFACTURING AIRBORNE WEATHER RADARS SINCE
1954.**

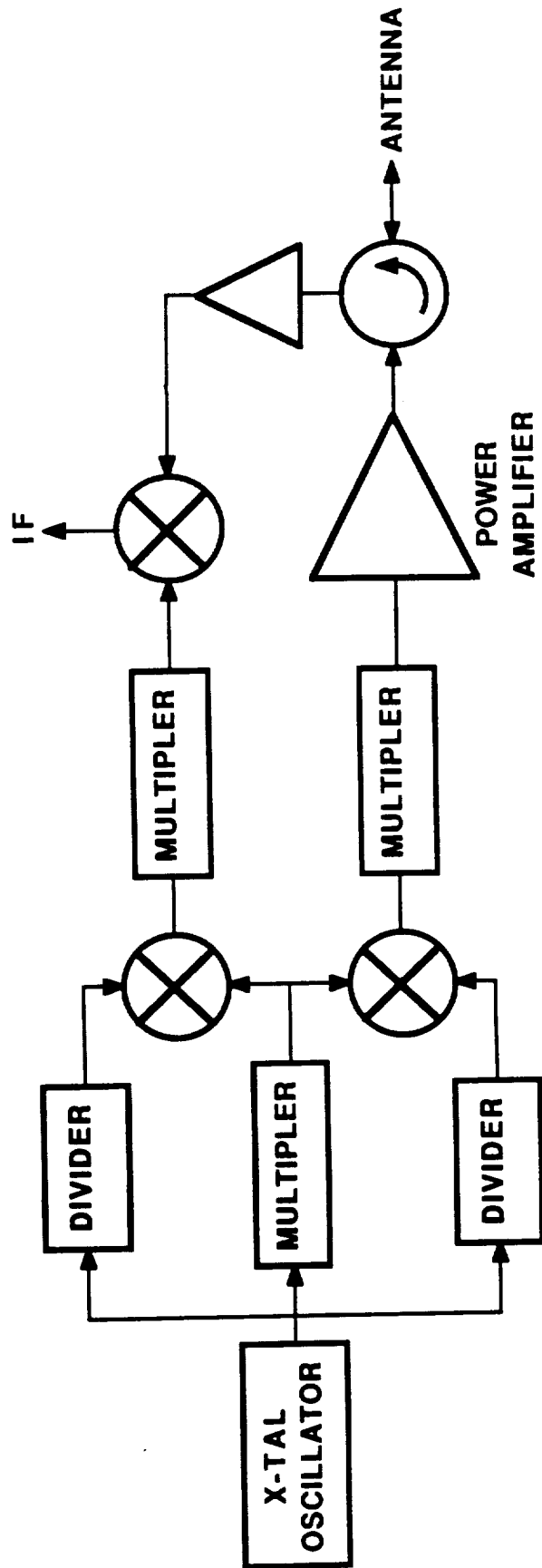
**HAVE THE MOST RADARS (OVER 35,000 DELIVERED) ON AIR
TRANSPORT TYPE AIRCRAFT FLYING WORLDWIDE.**

**COMMITTED TO THE DEVELOPMENT OF AIRBORNE WEATHER RADAR
WITH FORWARD LOOKING PREDICTIVE WINDSHEAR DETECTION
CAPABILITY.**

**BENDIX/KING ATAD RADARS
IN CURRENT AIRLINE FLEETS**

- RDR-1E: MAGNETRON TRANSMITTER NOT SUITABLE FOR WINDSHEAR
DETECTION.**
- RDR-1F: MAGNETRON TRANSMITTER NOT SUITABLE FOR WINDSHEAR
DETECTION.**
- RDR-4A: LATEST GENERATION
SOLID-STATE TRANSMITTER
FULLY COHERENT
DOPPLER TURBULENCE DETECTION CAPABILITY**

RDR-4A FREQUENCY GENERATION



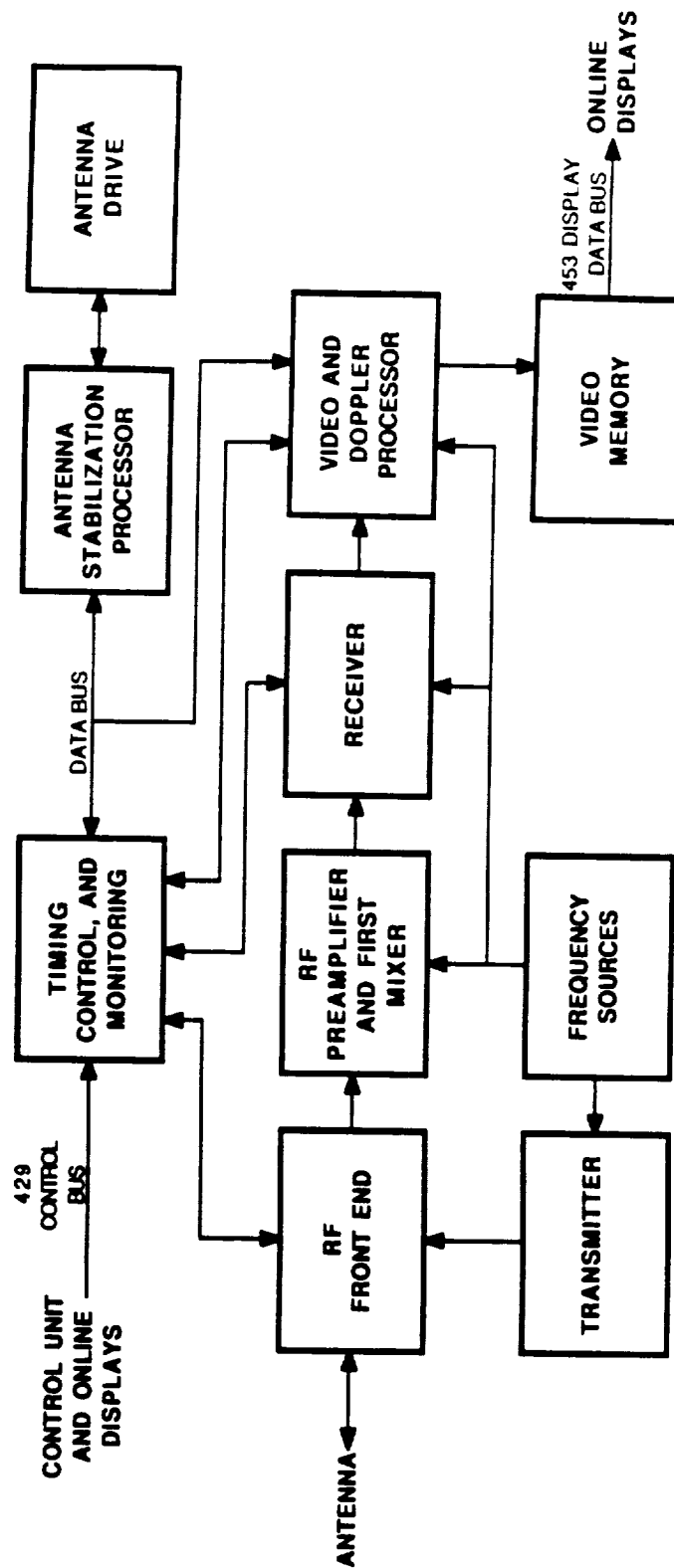
PLAN

- **TO ADD WINDSHEAR DETECTION CAPABILITY TO THE RDR-4A SYSTEM AS A MODIFICATION.**
- **CONDUCT FLIGHT TESTS WITH AIRLINES DURING 1991.**

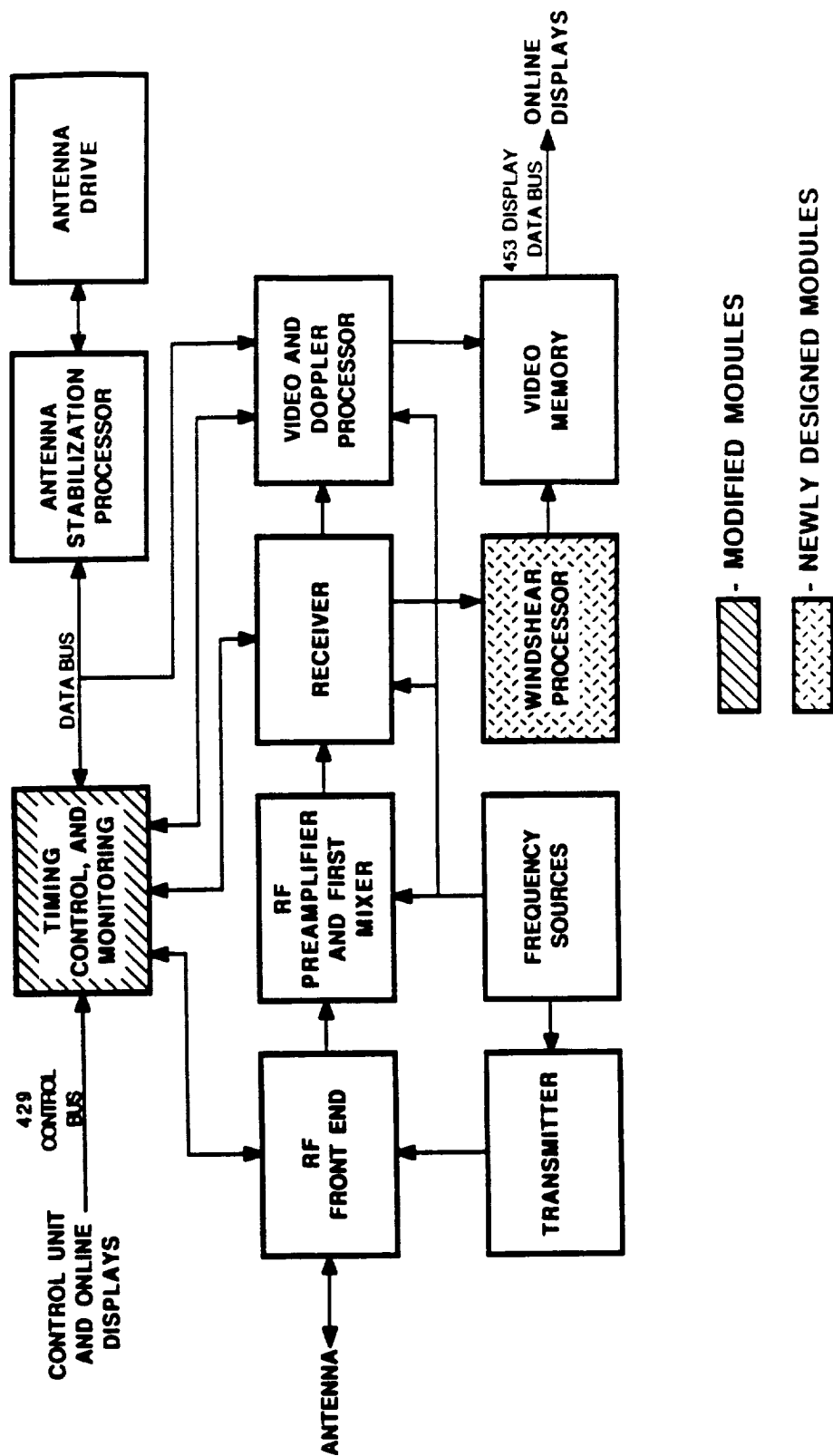
MODIFICATIONS

- RECEIVER/TRANSMITTER:**
- ADD WINDSHEAR DETECTION HARDWARE AND SOFTWARE
 - ADD WINDSHEAR MODE CONTROL SOFTWARE
 - ADD WINDSHEAR DATA TO THE OUTPUT BUSES
- CONTROL PANEL:** ADD WINDSHEAR MODE SELECTION CAPABILITY
- INDICATOR:** ADD WINDSHEAR DATA DISPLAY CAPABILITY
- ANTENNA:** NO MODIFICATIONS REQUIRED

RDR-4A FUNCTIONAL BLOCK DIAGRAM



RDR-4A WITH WINDSHEAR DETECTION



RDR-4A CHARACTERISTICS

	WEATHER AND MAP MODE	TURBULENCE DETECTION	WINDSHEAR DETECTION
TRANSMITTER PEAK POWER	125 W (NOMINAL)		
PULSE WIDTH	6 AND 18 μ SEC ALTERNATING	6 μ SEC	2 μ SEC
PRF	380 Hz	1600 Hz	6000 Hz
MAXIMUM RANGE	320 NMILES	40 NMILES	10 NMILES
OPERATING MODE	PULSED COHERENT		
FREQUENCY	9345 + 2 MHz		
SYSTEM NOISE FIGURE	5 DB		
ANTENNA SCAN	180°		40°
ANTENNA GAIN	35 DB		
ANTENNA BEAMWIDTH	3.3° ELEVATION 3.4° AZIMUTH		
TILT CONTROL	+ 15° MANUAL		AUTOMATIC

ISSUES

- TECHNICAL:**
- GROUND CLUTTER ELIMINATION
 - ESTABLISHMENT OF HAZARD THRESHOLDS
 - DEFINITION OF DISPLAY DATA BUS CHARACTERISTICS
 - SPECIFYING DATA INPUT REQUIREMENTS
 - DEFINITION OF FORM/FIT/FUNCTIONAL REQUIREMENTS (ARINC)
- OPERATIONAL:**
- MEANS OF SELECTING WINDSHEAR MODE
 - DISPLAY MEANS
 - AURAL ALERTS
 - INTERACTION WITH REACTIVE WINDSHEAR DETECTION SYSTEM
- CERTIFICATION:**
- ESTABLISHMENT OF A CERTIFICATION CRITERIA SIMILAR TO THE REACTIVE WINDSHEAR DETECTION SYSTEM

**ESSENTIAL REQUIREMENTS FOR CERTIFICATION
WITHOUT EXTENSIVE FLIGHT TESTS**

- ESTABLISHMENT OF PERFORMANCE CRITERIA USING SIMULATED DATA (NASA)**
- DEFINITION OF TEST MEANS USING SIMULATED SIGNAL INPUTS (NASA)**
- MINIMUM OPERATIONAL REQUIREMENTS (RTCA)**
- TSO (FAA)**
- ADVISORY CIRCULAR FOR AIRWORTHINESS AND OPERATIONAL APPROVAL (FAA)**